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Pulsed laser ablation in liquids: an efficient approach for nanofluids fabrication

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Nanofluids are advanced kind of liquids or heat transfer fluids mixed with a small concentration of nanometer-sized solid particles in suspension. Nanofluids have broad applications in industries where efficient heat transfer fluids are crucial for cooling or heating processes. In addition, the shortage of fossil fuels motivated researchers to use alternative energy sources such as solar energy, particularly, the Concentrating Solar Power (CSP) which is based on thermal energy conversion. Therefore, it is critical to enhance the efficiency and performance of the solar thermal systems by using highly stable, cost effective and efficient nanofluids. The aim of this contribution is the investigation of a nanofluid consists of copper nanoparticles nCu and Ethylene Glycol (EG) which has been made by a one-step method known as pulsed Nd:YAG laser ablation in liquids. In this method, pure copper target was ablated in the presence of EG under ambient conditions to form nCu-EG nanofuid. Structural and morphological analysis confirmed the successful ablation of the Cu target in EG, and spherical Cu nanoparticles were obtained. Thermal conductivity analysis of nCu-EG nanofluid revealed an enhancement in thermal conductivity of about 22.74%. These results confirmed that pulsed Nd:YAG laser ablation of a Cu target in EG could be a suitable method for the fabrication of efficient nanofluids for solar thermal engineering systems.

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